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Volume I
Statewide Summary
1985-1987

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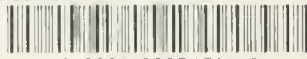


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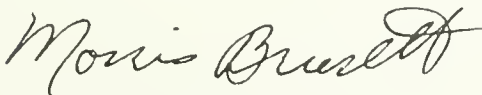
This plan titled, State of Montana 1984 Information Systems Plan, Volumes I and II, was approved by the Data Processing Advisory Council December 6, 1984.

The Plan, and the planning process which created it, provides benefits which include:

- Information to assess future equipment and software acquisitions
- An established current statewide plan documenting the general strategic direction for managing and utilizing information systems and resources in the agencies
- Planning and budget preparation assistance to Information Services Division for providing central computer and telecommunications services
- Aid in formulation of the Governor's Executive Budget
- Encouragement and support of agency information systems planning
- Improved and extended management participation in information systems planning

Costs of computer processing continue to fall as other government expenses are rising. The need to increase productivity encourages agency and state-wide planning. This document discusses Montana's present information processing activities as well as goals and strategies for the future.

The 1984 Information Systems Plan represents another step in agencies' continuing efforts to improve services and manage state government more effectively.



Morris Brusett, Director
Department of Administration

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EXECUTIVE SUMMARY

The state's dependence on information provided by computers has grown and will continue to grow as agencies try to provide better service and accomplish more without increasing personnel. Agencies spend approximately 2% of the state's budget on computerized information systems. Planning will help make sure that the state gets the most benefit from information systems.

Automated information systems are designed to organize, store, retrieve, and manipulate data to produce useful information. Effective information management requires agencies to concentrate on information management goals instead of the tools used to accomplish the goals. This plan emphasizes information management goals. Section II contains the Information System Goals and Strategies approved by the Data Processing Advisory Council. The plan identifies six major information processing issues. The issues include specific recommendations for agency management. The key issues are:

- Case for Automation

Increased productivity and the ability to provide better service are results state agencies can expect from automation. Agencies must focus on long term benefits as well as short term costs savings to fully realize automation's advantages.

- Statewide Telecommunications Network

The dispersion of agencies throughout Montana increases demand for telecommunication network services. Deregulation and new technologies are changing the industry. Rising costs must be stabilized and flexible plans developed to ensure viable networking in the future.

- Managing Information as a Resource

Agencies should view information as a valuable resource. Planning must examine short term costs, long term costs, and benefits which information systems offer agencies. Information management is most effective when data is shared between application software packages.

- Office Automation and End-user Computing

Office automation (OA) and end-user computing increase productivity and improve products and services. OA technologies, especially personal computers, aid in making more effective use of employee's time.

- Contingency Planning and Disaster Recovery

Many critical functions and services of state government are automated. Vital automated services must continue if the State's central computer is inoperable for an extended period. Proven contingency plans assure recovery of critical operations.

- Coordination (Control) of Data Processing Resources

The Director of the Department of Administration coordinates data processing in state government. Coordination consists of establishing general data processing policies, consulting with agencies, providing training, and promoting planning.

These issues along with the goals and strategies in Section II establish guidelines for agency management and decision makers.

INTRODUCTION

This plan was written for Montana information managers including: legislators, department and division administrators, and data processing coordinators. A minimum of jargon has been used. A glossary has been included to define technical terms and explain basic concepts.

Montana Code Annotated 1983, Section 2-17-501, requires the Director of the Department of Administration to establish data processing policies and a statewide data processing plan for state government. The Director's responsibilities include:

- Establishing policies and a statewide plan (in cooperation with state agencies), for the operation and development of data processing for state government.
- Reviewing and approving agency specifications and procurement methods for data processing equipment (excluding specifications and methods relating to instruction and research in the university system). Insuring network compatibility and conformity with the statewide data processing plan.
- Reviewing and approving all contracts for private sector data processing services to insure conformance with the statewide data processing plan.
- Operating and maintaining a central computer center and a data processing equipment pool for the use of all state agencies and political subdivisions.

The Statewide Information Systems Plan is part of the biennial planning process. It is a dynamic plan for information processing in Montana state government. It focuses on strategic plans of state agencies and outlines the statewide direction for information management. The plan was assembled from individual plans written by agencies. The university system, due to their unique planning process, did not contribute to the plan. For a list of participants, please refer to the acknowledgments. The agency plans were compiled and summarized by Information Services Division (ISD) of the Department of Administration (DOA).

This plan summarizes:

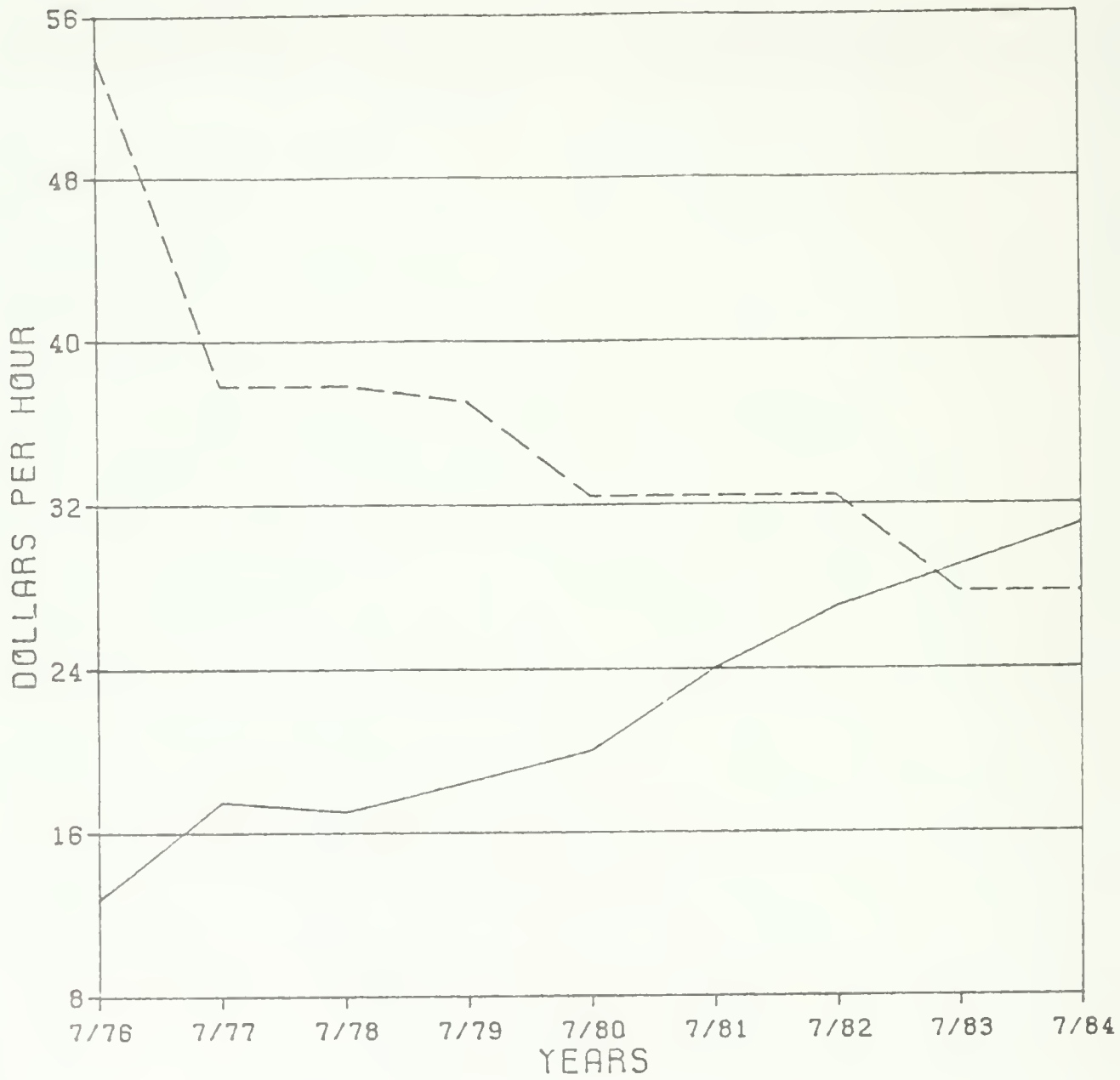
- Key data processing and information management issues
- Statewide goals, objectives and strategies pertaining to information management
- A statewide history of planning
- Description of data processing in Montana
- Summaries of agency information systems plans
- Individual agency plans (see Volume II--Individual Agency Summaries)



SECTION I--OVERVIEW OF KEY ISSUES

This section deals with major issues affecting information processing in state government. Each topic is briefly described in an abstract. Issues and recommendations are identified. Directions established by the Data Processing Advisory Council and Information Services Division are included in the overview.

MACHINE COST VS. PROGRAMMER COST



— HOURLY PROGRAMMER COST (SYSTEMS DEVELOPMENT BUREAU)
--- HOURLY MACHINE RATE (CENTRAL COMPUTER)

A CASE FOR AUTOMATION

Abstract

Increased productivity and the ability to provide better service are results state agencies can expect from automation. Agencies must focus on long term benefits as well as short term cost savings to fully realize automation's advantages.

Issues

Automated information systems can increase agency efficiency and the level of service to Montanan's. These systems benefit the state by:

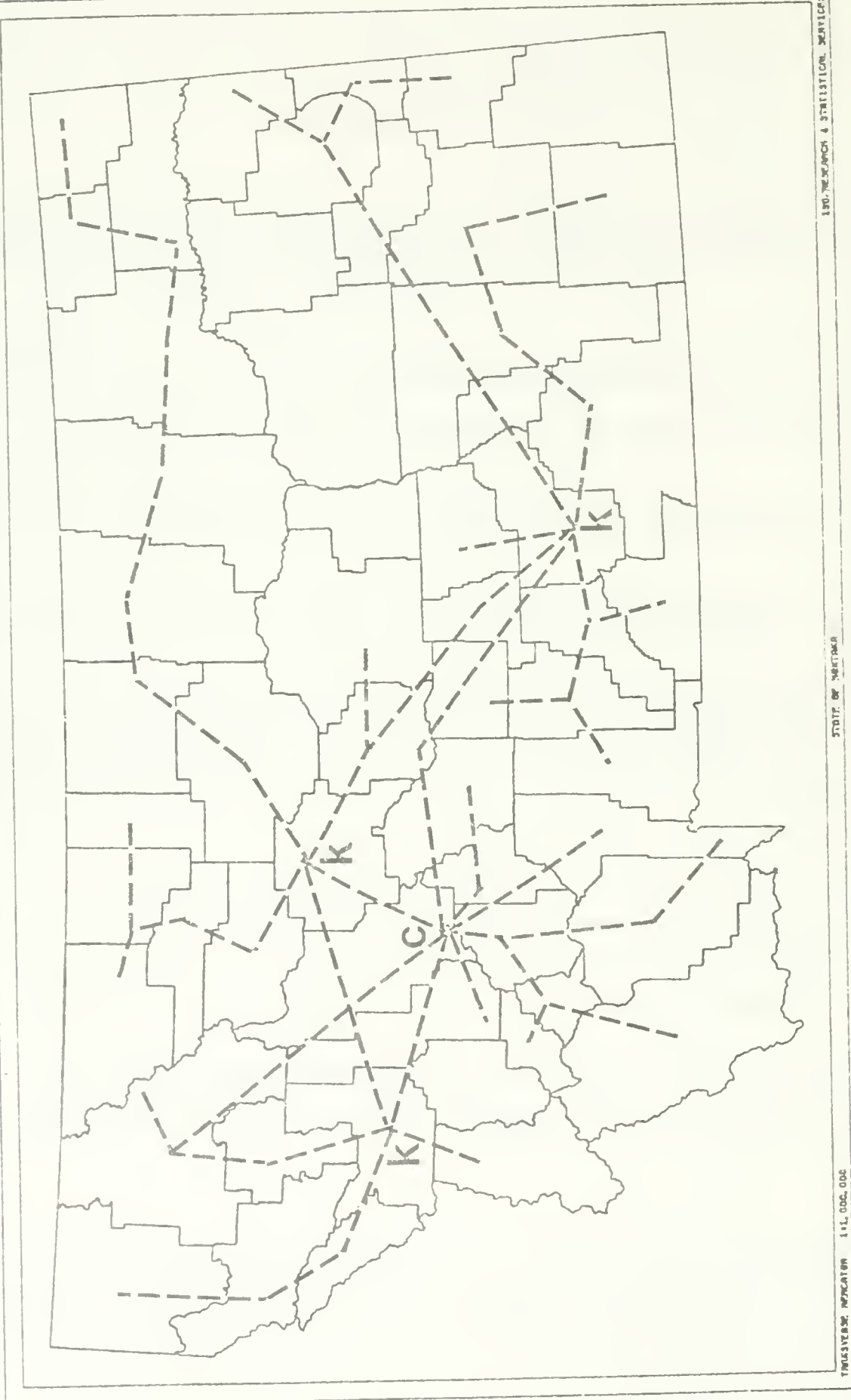
- Providing cost savings--word processing, for example, provides agencies with immediate cost savings compared with manual means of accomplishing similar tasks.
- Avoiding future costs--acquiring automated systems may avoid or reduce future costs. Purchasing the state's telephone system, for example, will reduce costs in the long run.
- Providing future opportunities--automating payroll functions in 1982, for example, allowed the State Auditor's Office to utilize direct bank payroll deposit in 1984.

Information systems are improving and hardware costs are falling. Personnel and other operational costs are rising. (See graph on page 6.) Because the current budget process requires demonstrating short term paybacks, systems which would be cost effective over a longer period are difficult to acquire. Automated system development in state government may slow while operational economies argue for increasing system utilization.

Recommendations

- Plan for system acquisition examining both long and short term benefits.
- Improve acquisition processes for small systems.
- Install automated systems to help control personnel costs and boost productivity.
- Provide programmers and end-users with productivity tools to reduce system costs.
- Reduce paperwork by substituting electronic media for paper documents.
- Acquire computer processing power to support new database applications and end-user software.

PROPOSED DATA TELECOMMUNICATIONS NETWORK



190. RESEARCH & STATISTICAL SERVICES

STATE OF NORTH CAROLINA

TRANSMISSION MAPKATER 111, 000, 000

c: computer center k: concentrator

STATEWIDE TELECOMMUNICATIONS NETWORK

Abstract

The dispersion of agencies throughout Montana increases demand for telecommunication network services. Deregulation and new technologies are changing the industry. Rising costs must be stabilized and flexible plans developed to ensure viable networking in the future.

Issues

Deregulation has changed the telecommunication picture for Montana. Telecommunication (data and voice communications) rates are increasing, costs must be stabilized.

Montana has entered an era of distributed data processing (DDP). DDP shares data and processing functions between local and remote computers. DDP improves efficiency and productivity by bringing the data and power of several computers to the end-user.

Montana's telecommunications needs are growing. Service is expanding 25-35% annually. Technologies such as electronic mail increase reliance on networks. The scope of network services provided political subdivisions is being reviewed, and will effect network development.

Planning is required to ensure a reliable and cost effective network. The Telecommunications Policy Advisory Council was established to help set long term telecommunication goals and directions.

Recommendations

- Reconfigure data communications network. (See page 8.)
- Request proposals from vendors to stabilize short term costs, provide for anticipated growth, and reduce duplication of lines.
- Minimize the cost of data communications to assure that it is not an inhibitor to network usage.
- Facilitate communications between computers using different communication protocols.
- Integrate voice and data communications planning as appropriate.

MANAGING INFORMATION AS A RESOURCE

Abstract

Agencies should view information as a valuable resource. Planning must examine short term costs, long term costs, and benefits which information systems offer agencies. Information management is most effective when data is shared between applications.

Issues

Computer managers must become data resource managers to fully achieve automation's benefits. Computer and data resource managers differ in perspective. Computer managers are concerned with running software applications to accomplish specific tasks. Data resource managers are part of the management team. They view information as a resource and manage information to meet organizational goals.

Information is a resource not 'owned' by a single agency or software system. Automated systems should be developed with a statewide perspective when they effect other information systems. If an information system does not impact other agencies or systems, it can be designed to 'stand alone'.

Information management focuses on agency goals and software solutions--not on computer hardware. Distributed data processing provides information managers with considerable flexibility. Planning should evaluate needs first and where data is processed second.

Autonomous systems have several short term benefits: faster applications development, reduced data compatibility requirements, and local control. Sometimes systems are more flexible without outside controls, however autonomous systems may cost the state more as multiple systems collect, process, and distribute the same data. Autonomous systems frequently are short lived and fail to align with long term goals.

Recommendations

- Computer managers must make the transition to data resource managers.
- Agencies should use database management systems and associated software tools to reduce duplicated data and employee efforts.
- Data should be shared between applications and agencies when appropriate.
- Agencies should use available technical assistance and consultation for database design, systems planning, and acquisition.

OFFICE AUTOMATION AND END-USER COMPUTING

Abstract

Office Automation (OA) and end-user computing increase productivity and improve products and services. OA technologies (especially personal computers) aid in making more effective use of employee's time.

Issues

End-users utilize software on the host computer and in local office systems. New office automation technologies have increased end-user productivity.

Personal computers have spread through state agencies raising concerns about computer and data compatibility. Managers must address a variety of new automation problems within their own offices including: accessing communication networks, data security, back up of critical information, and equipment maintenance. End-users need ongoing training and technical assistance.

Recommendations

- Use office automation to perform routine tasks.
- Link offices using distributed data processing and electronic mail.
- Provide training to end-users and managers.
- Promote office automation user's groups.
- Provide consultation services and user support.
- Evaluate new technologies for appropriate use in State government to assist agencies.
- Standardize hardware and software as appropriate.
- Improve acquisition processes for small systems.
- Enlarge and improve statewide data telecommunication network.
- Eliminate paperwork and replace with electronic media when cost effective.

CONTINGENCY PLANNING AND DISASTER RECOVERY

Abstract

Many critical functions and services of state government are automated. Vital automated services must continue if the State's central computer is inoperable for an extended period. Proven contingency plans assure recovery of critical operations.

Issues

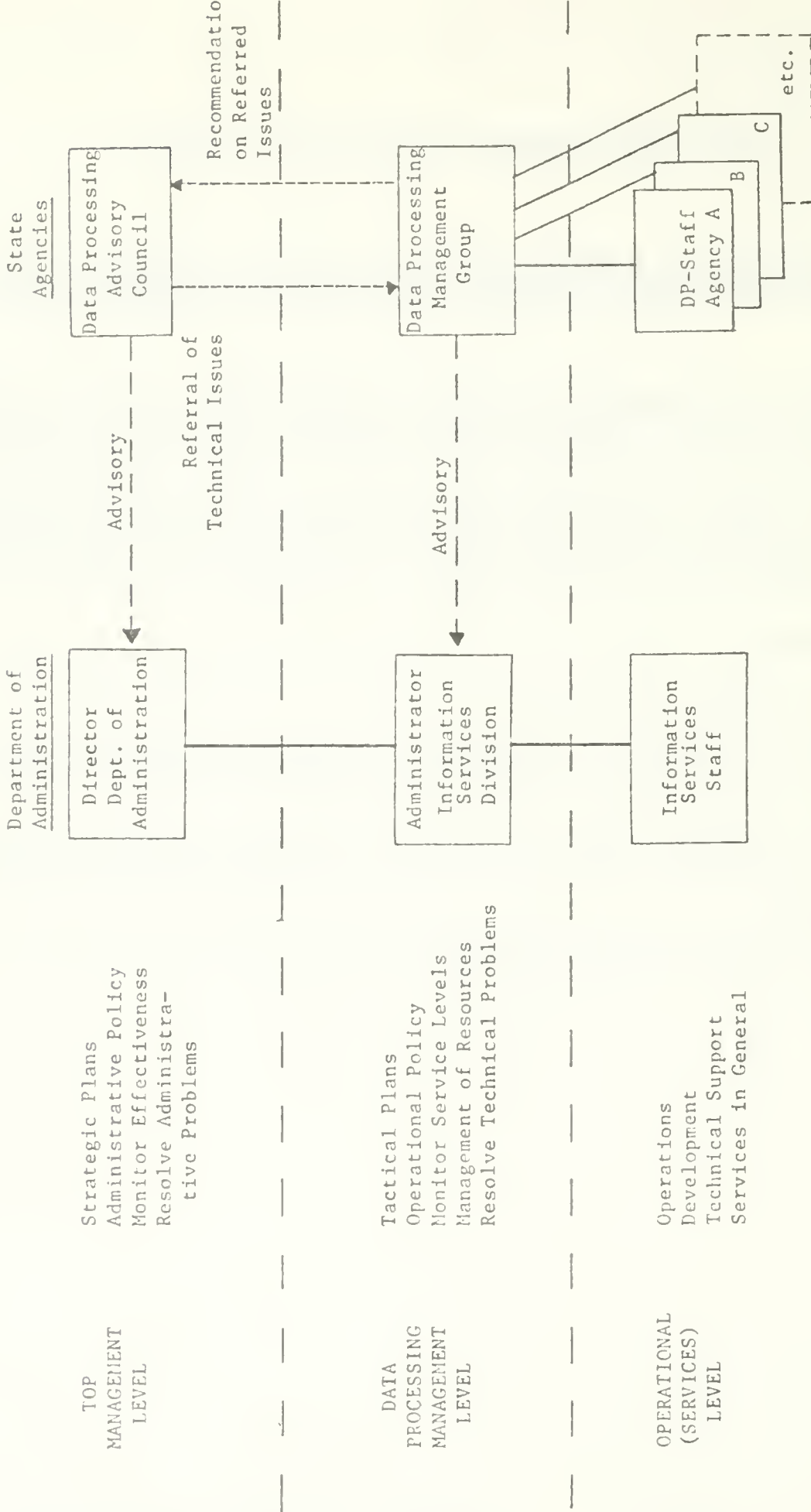
Interruption of normal computer processing could cripple state government. Contingency planning develops strategies to maintain computing in the event of interruption and prioritizes applications to determine which functions should be recovered first.

Contingency planning is complicated by many factors. To insure adequate recovery capabilities, alternate computer resources must be made available. Critical applications should be designed or modified to be transportable (i.e., able to run on backup computer equipment with little modification). The integrity of the states vital records is crucial to disaster recovery planning. Top executives should define which records are vital and establish proper back up procedures.

Recommendations

- ISD will establish and maintain a back-up facility at the National Guard Armory. Scheduled installation is Fall 1985.
- Agencies must identify crucial applications by determining legal ramifications if schedules are not kept, costs associated to service interruptions, identifying functions that are dependent on computer availability.
- Critical applications should be designed or modified to run on alternate equipment. Identified "critical" applications should be individually tested to assure portability--this will require interaction between ISD and the responsible user agency.
- Design a computer facility to limit avoidable disruptions such as power failures, air conditioning failure, damage by water, fire, sabotage, etc.

ORGANIZATION OF DATA PROCESSING MANAGEMENT AND COORDINATION



TOP MANAGEMENT LEVEL

Strategic Plans
Administrative Policy
Monitor Effectiveness
Resolve Administrative Problems

DATA PROCESSING MANAGEMENT LEVEL

Tactical Plans
Operational Policy
Monitor Service Levels
Management of Resources
Resolve Technical Problems

OPERATIONAL (SERVICES) LEVEL

Operations Development
Technical Support
Services in General

Organizational Relationship

Advisory Relationship

COORDINATION (CONTROL) OF DATA PROCESSING RESOURCES

Abstract

The Director of the Department of Administration coordinates data processing in state government. Coordination consists of establishing general data processing policies, assisting and consulting with agencies, providing training, and promoting planning.

Issues:

Data processing can be controlled by either developing rigid policies and standards or by coordinating agency development. Coordination has several benefits including:

- Focusing on results rather than adherence to rigid standards.
- Responding to rapid changes in technology.
- Promoting agency director involvement with data processing, information systems planning, and resource allocation.

The Director of the Department of Administration in making decisions on the coordination and control of information processing utilizes the Data Processing Advisory Council (DPAC) to assure that interests of state agencies are represented. The mission of the DPAC is to improve the effectiveness of agency operations through the appropriate use of computers and information processing technology. Goals in the DPAC charter include: shifting the emphasis from management of equipment to management of information as a resource, making recommendations on the establishment of a planning process and policies, and coordinating the rapid expansion of office automation throughout state government.

The Data Processing Management Group consists of managers from several agencies that have their own data processing staff. This group makes recommendations on technical issues to the Administrator of Information Services Division and to the DPAC. The DP managers assist with tactical plans, operational policies, and monitor service levels. The figure on page 16 shows the relationship of these advisory groups to the Department of Administration.

Recommendations

- Establish general data processing policies to guide agencies.
- Provide training to assist agencies in designing and developing information systems.
- Reduce the cost of acquiring equipment thru development of term contracts. Term contracts encourage selection of equipment compatible with statewide direction.
- Improve the statewide telecommunications network.
- Review plans for appropriate use of technology and compliance with statewide direction.



SECTION II--GOALS AND STRATEGIES

This section contains goals and strategies for improving information processing in state government. These goals and strategies were approved by the Data Processing Advisory Council. When appropriately implemented these strategies will improve the efficiency and effectiveness of state government by:

- Improving responsiveness of state government to the needs of the public.
- Providing managers at all levels with improved access to information needed for effective decision making.
- Increasing the productivity of state employees.
- Improving the efficiency of communications between government and the public sector.
- Facilitating compliance with Legislative and Federal mandates.

Achievement of these goals will have a significant impact on improving the effectiveness of state government. Adherence to strategic direction represented by the goals may be difficult because budgets are limited. The long term benefits of information management will have to be weighed against short term, operational needs.

In spite of the difficulties, the importance of establishing strategic directions cannot be overemphasized. Information management technologies and the complexities of planning in state government increase the need for following established goals and strategies.

GOALS:

DESIRED RESULTS:

Adopted by the Data Processing
Advisory Council April 5, 1984

Goal 1:

Improve accessibility and manageability of information stored in computer systems.

Shared data resources are increasingly used by staff and management of state agencies resulting in more beneficial information.

Goal 2:

Computer literacy and technical knowledge of state personnel must keep-up with evolving information management methods.

Staff and managers make more efficient use of automation as a result of training.

Goal 3:

Improve the systems development process by adopting and utilizing tools designed to make programmers and analysts more productive and significantly reduce the time and cost of developing automated systems.

Software development tools reduce system development costs by increasing analyst and programmer productivity.

Goal 4:

Increase the productivity of state employees by choosing and implementing appropriate computerized tools for use in state government.

Successful agency and statewide office automation strategies result in improved employee productivity.

Goal 5:

The integrity, security, and recoverability of data and programs critical to state operations regardless of computer configuration, must be assured at all times.

Programs and data running on State computers are secure from unauthorized access or handling. Back-up systems assure ordered recovery in event of disaster.

Goal 6:

Promote the appropriate use of information in an electronic form to reduce paperwork and minimize communication delays.

Paperwork and paper shuffling are reduced by electronic forms of information storage, manipulation, and dissemination.

GOAL #1

IMPROVE ACCESSIBILITY AND MANAGEABILITY OF INFORMATION STORED ON COMPUTER SYSTEMS.

Strategies

- Make the transition from computer managers to data resource managers.
- Increase our knowledge of information needs and the benefits of appropriately sharing common data elements within each agency.
- Promote the appropriate sharing of data wherever possible.
- Promote the appropriate use of Database Management Systems and associated software tools.
- Establish a mechanism for making selected data interchangeable between mainframe computers and microcomputers.
- Expand data communications network capabilities to include IBM/SDLC and asynchronous protocols.
- Implement information processing software tools to be utilized directly by top executives and managers (examples: Decision Support Systems and Financial Modeling Systems).
- Minimize the cost of data communications to assure that it is not an inhibitor to network usage.
- Provide the software tools and people interface necessary to support effective end-user computing (i.e., Information Center Concept).
- Minimize the cost of Database related processing to assure that cost is not an inhibitor to the appropriate use of database technology.

GOAL #2

COMPUTER LITERACY AND TECHNICAL KNOWLEDGE OF STATE PERSONNEL MUST KEEP-UP WITH EVOLVING INFORMATION MANAGEMENT METHODS AND TOOLS.

Strategies

- Continue to provide computer related educational services for all agencies.
- Provide more courses for non-data processing professionals.
- Use all forms of educational media (i.e., video tape and disks, online interactive from a computer workstation, in-house seminars, etc.) whenever feasible.
- Provide a Computer and Information Processing Concepts Series as a regular course series for agency heads, department directors, legislators and division administrators.
- Provide a comprehensive training program to meet the educational needs of the State's professional data processing staff.

GOAL #3

IMPROVE THE SYSTEMS DEVELOPMENT PROCESS BY ADOPTING METHODS AND UTILIZING TOOLS DESIGNED TO MAKE PROGRAMMERS AND ANALYSTS MORE PRODUCTIVE AND SIGNIFICANTLY REDUCE THE TIME AND COST OF DEVELOPING AUTOMATED SYSTEMS.

Strategies

- Evaluate and acquire software that improves the productivity of data processing professionals.
- Promote the use of software productivity tools by data processing professionals in all agencies.
- Devise and/or adopt methods that minimize the personnel costs and time required to develop automated systems.
- Install the equipment necessary to maintain a high level of performance for development tools and end-user software.
- Provide the people interface necessary to support the effective use of application development tools.

GOAL #4

INCREASE THE PRODUCTIVITY OF STATE EMPLOYEES BY CHOOSING AND IMPLEMENTING APPROPRIATE COMPUTERIZED TOOLS FOR USE IN STATE GOVERNMENT OFFICES.

Strategies

- Include planning for office automation as an integral part of each agency's information systems plan.
- Implement and coordinate the use of DISOSS (Distributed Office Support System) as a primary office system on the statewide data communications network.
- Continue to provide office automation center support services in Information Services Division.
- Establish appropriate levels of equipment and software standardization to assure functional compatibility between office systems and central processors.
- Implement more efficient acquisition procedures for small systems (i.e., microcomputers and word processors priced under \$10,000).
- Continue with the formulation and regular meetings of the Office Automation Users Group in order to determine the needs for improved service.

GOAL #5

THE INTEGRITY, SECURITY AND RECOVERABILITY OF DATA AND PROGRAMS CRITICAL TO STATE OPERATIONS REGARDLESS OF COMPUTER CONFIGURATION, MUST BE ASSURED AT ALL TIMES.

Strategies

- Make Agencies responsible for storing critical data, programs and documentation off-site from the facility where it is normally processed.
- Continue to provide an off-site storage vault for computer tapes and records and make it available to all state agencies.
- Install software security tools and procedures like ACF2 (Access Control Facility 2) on all computer systems housing sensitive or critical data.
- Promote a network of agency security officers to coordinate the security needs of individual agencies.
- Base disaster recovery plans for the central system on providing a second mainframe with compatible operating characteristics within the Department of Justice. Provide limited backup processing capability until a temporary processing facility can be set-up by Information Services Division.
- Prioritize information systems so that during time of disaster, recovery processing will be done on the basis of criticality to state government as a whole.
- Promote automated system development with data integrity, security and recoverability included as major design considerations.

GOAL #6

PROMOTE THE APPROPRIATE USE OF INFORMATION IN AN ELECTRONIC FORM TO REDUCE PAPERWORK AND MINIMIZE COMMUNICATION DELAYS.

Strategies

- Implement electronic mail on the statewide data communications network.
- Tailor computer output information to be accessed and read directly from a computer workstation screen whenever paper is not needed.
- Lead the way in exploiting computer and data communication technology to disseminate information in lieu of printed manuals and publications.
- Promote the design of systems that minimize paperwork and other manual processes needed to handle agency information.

SECTION III--DATA PROCESSING IN STATE GOVERNMENT

Section III covers information systems planning history, data processing in agencies, computer equipment owned by state agencies, and describes Information Services Division. An organization chart for ISD and a table listing state owned equipment are included.

INFORMATION SYSTEMS PLANNING HISTORY

The following is a summary of important events in information systems planning in Montana State Government.

- 1976 Executive Order 12-77 appointed Office of Budget and Program Planning (OBPP) coordinator of data processing in state government.

Department of Administration (DOA) developed the Long Range Information Processing Plan Phase I. The plan stressed the need for biennial and continuous planning.

Issues in the 1976 Plan included: data security and privacy, uninterrupted processing, data base management, and attracting, training and retaining data processing personnel. Minicomputers provided agencies with the option of bypassing DOA's central mainframe computer. Decentralized data processing (agencies running stand-alone data processing shops) raised both technical and policy issues.

- 1978 Long Range Information Processing Plan Phase II was developed by DOA. This plan was sequel to the 1976 plan and began a long range (5 year) planning process. The 1976 plan was concerned with the issue of decentralized data processing. By contrast, the 1978 plan recommended distributing data processing. Distributed data processing is characterized by computers in multiple locations linked by telecommunications. Information is stored and processed on the computer(s) appropriate for each task. Computers in distributed systems are designed to stand alone and work with other computers.

Issues in the 1978 Plan included: security and privacy of data, distributed data processing, centralizing large scale computers and data storage on DOA's mainframe computer, improving response time, and the need for "a comprehensive, reliable telecommunications network."

- 1983 House Bill 427 transferred the coordination of statewide data and information processing from OBPP to DOA.

Data Processing Advisory Council charter was approved. The 1984 Information Systems Plan follows the Council's Data Processing Goals and Strategies.

Office of Legislative Auditor completed and published an audit titled Coordination and Control of State Data Processing. This report outlined means of improving the coordination and control of data processing activities and has had a significant impact on the content of the 1984 plan.

- 1984 The agency planning process, the basis of this plan, was initiated.

Planning for information systems in Montana has taken place during a period of rapid technological change. To illustrate, personal computers (which did not exist 10 years ago) perform a variety of functions for state agencies. Many of the issues contained in the 1976 and 1978 Plans, (telecommunications, distributed data processing, data base, and security) continue to exist and are aggravated by Montana's changing information processing environment.

DATA PROCESSING IN STATE AGENCIES

The technology of automation has rapidly improved. Computers are doing more work for less money. (See graph page 6.) Applications and programming software has become more powerful, and in many cases easier to use, increasing productivity.

Some agencies are more automated than others. A chart showing computer equipment communications capabilities, and information systems personnel is included on page 30. Data is provided as reported by agencies. More detail is provided in individual agency summaries in Volume II.

All dollar figures are rounded to the nearest thousand.

- Thirteen agencies report owning 24 major computer systems, 15 manufactured by IBM. Two agencies do not own computers.
- All but two agencies are connected to the central computer system maintained by Information Services Division (ISD).
- Seven agencies account for 80% of information systems personnel.

INSTALLED AGENCY INFORMATION SYSTEMS EQUIPMENT,
PERSONNEL, AND COMMUNICATIONS CAPABILITIES

AGENCY	MAJOR COMPUTER SYSTEM(S)	NUMBER SINGLE USER COMPUTERS ¹	INFORMATION SYSTEMS PERSONNEL ²
Legislative Auditor	-	2	3.5
Legislative Fiscal Analyst	-	2	0
Legislative Council	-	5	13
Governor's Office	-	7	9
Secretary of State	-	3	.5
State Auditor	-	0	9
Office of Public Instruction	1) Honeywell level 6-47 1) Alpha micro 1) Televideo	4	13.5
Dept. of Justice	2) IBM 8100's	3	37
Public Service Commission	-	0	1.5
State Library	-	3	6.5
Historical Society	1) Altos 986	5	.5
Fish, Wildlife and Parks	1) Ace Discovery	4	5.5
Health and Environmental Sciences	-	12	13
Highways	13) IBM Series I	27	53.5
State Lands	1) IBM Series I	13	5
Livestock	-	5	9
Natural Resources & Conservation	1) Honeywell DPS6/94	10	24
Revenue	2) IBM 8100	7	48.5
Administration	1) IBM 3033 1) IBM 4381	25	155.25
Agriculture	1) Televideo TS 816/40	2	3

Nov. 1984

**INSTALLED AGENCY INFORMATION SYSTEMS EQUIPMENT,
PERSONNEL, AND COMMUNICATIONS CAPABILITIES**

AGENCY	MAJOR COMPUTER SYSTEM(S)	NUMBER SINGLE USER COMPUTERS ¹	INFORMATION SYSTEMS PERSONNEL ²
Institutions	-	21	7
Commerce	1) Alpha Micro	8	8
Labor and Industry	6) IBM 8100's 1) Wang VS100	22	58.5
Social and Rehabilitation Services	1) IBM 8100 1) Honeywell DPS 6/48	40	55
TOTALS	-----	230	539.25

Nov. 1984

¹ It is common for these devices to be used by non-information system personnel.

² Agencies determined which positions were information systems personnel and in which category they were to be included. See Volume II for more detail.

STATE TOTAL INFORMATION SYSTEMS PERSONNEL

Position Type	Actual	Projected		
	1984 FTE	1985 FTE	1986 FTE	1987 FTE
Management	52.75	53.75	54.75	54.75
Analysis/Prog.	122	121.5	133.5	133.5
Operations	55.5	55.5	58.5	58.5
Data Entry/ Word Processing	229.75	269.75	292.75	293.25
Other	79.25	84.5	85	90.5
TOTAL	539.25	585	624.5	630.5

CENTRAL COMPUTER CAPABILITIES

Each agency directly or indirectly uses the central mainframe computer, an IBM 3033 operated and maintained by the Department of Administration, Information Services Division located in the basement of the Mitchell Building. The 3033 includes storage and communications devices, back-up power supply, and peripheral equipment.

The IBM 3033 has internal (random access memory) of 16 million characters. 48 disk drives hold about 21 billion characters in mass storage. 15 tape drives manipulate 19,000 reels of magnetic computer tape. An IBM 4381 is used to back-up the IBM 3033. Current plans are to move the IBM 4381 to the Helena National Guard Armory to support Department of Justice telecommunications needs and to provide off-site back-up for the central computer.

Many files or applications require a mainframe's speed and size. Managers must decide which computer (central mainframe or smaller local computer) will work best on a case by case basis. However, the central computer supports many applications providing cost effective computing.

Approximately 1,000 terminals statewide access the central computer--using centrally managed files or running larger application software programs. The number of terminals accessing the host is rapidly growing.

Operating the central computer requires balancing two needs: The system must be reliable and must accommodate change. Change--new users, application software, hardware, or new system software--threatens system reliability. Yet the system must improve and adapt to agency needs.

ISD has implemented procedures to manage central computer problems and changes. Changes, and their effects, are tracked through the system resulting in improved reliability.

Information Services Division has established the following service objectives for the central computer:

- System Availability:
Percent of time central computer is working.

Weekdays 8 a.m. - 5 p.m.	98%
Weekends, nights, holidays	95%

- Network Inquiry Response Time:
Longest time user must wait for response from central computer.

Weekdays 8 a.m. - 5 p.m.	4 seconds
----------------------------------	-----------

- Batch Job Turnaround Time:
Longest time to complete batch processing job.

Weekdays 8 a.m. - 5 p.m.	4 hours
Weekends, nights, holidays (discount rate)	24 hours

The IBM 3033 was installed in 1981 and is operating at capacity. The system must be upgraded to meet increased workloads.

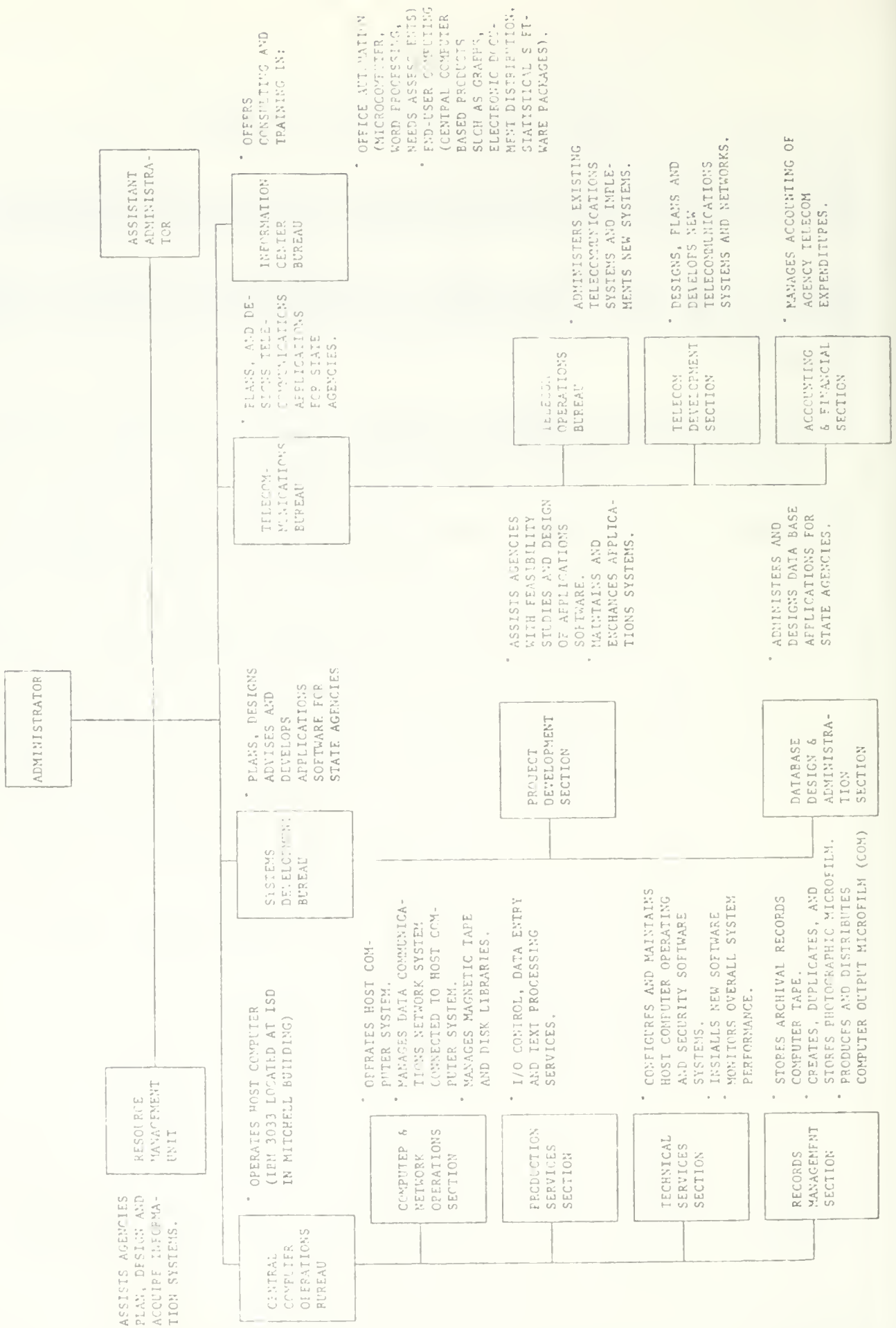
The IBM 4381 currently handles some processing otherwise performed by the IBM 3033. This temporary solution will change when the IBM 3033 is replaced by an IBM 3081.

Since the IBM 3033 was installed, advances in technology have provided fresh alternatives for expanding computer capacity. The IBM 3033 will be replaced by an IBM 3081 prior to the relocation of the IBM 4381. The IBM 3081 has several advantages over the IBM 3033.

The IBM 3081:

- is faster (almost twice as fast)
- has a larger memory (24 million vs. 16 million characters random access memory)
- uses less electricity (1/4 of the IBM 3033)
- requires less air conditioning (1/2 of the IBM 3033)
- is smaller

The IBM 3081 will provide faster processing and the ability to meet increasing needs for computer services.



INFORMATION SERVICES DIVISION

Information Services Division offers data processing services and supports agency use of automated information management technologies. ISD is responsible for operating the central computer, managing telecommunications, system development, and coordinating equipment acquisition, information planning, and training.

Information Services Division was reorganized in 1984 into four bureaus:

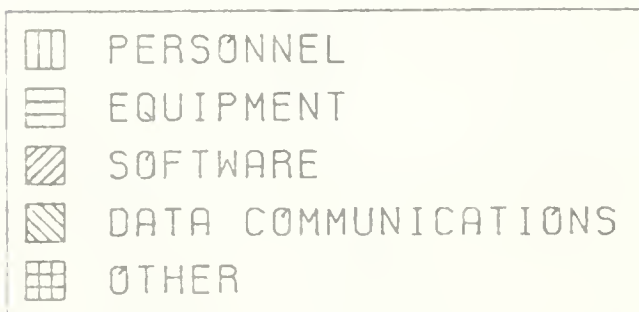
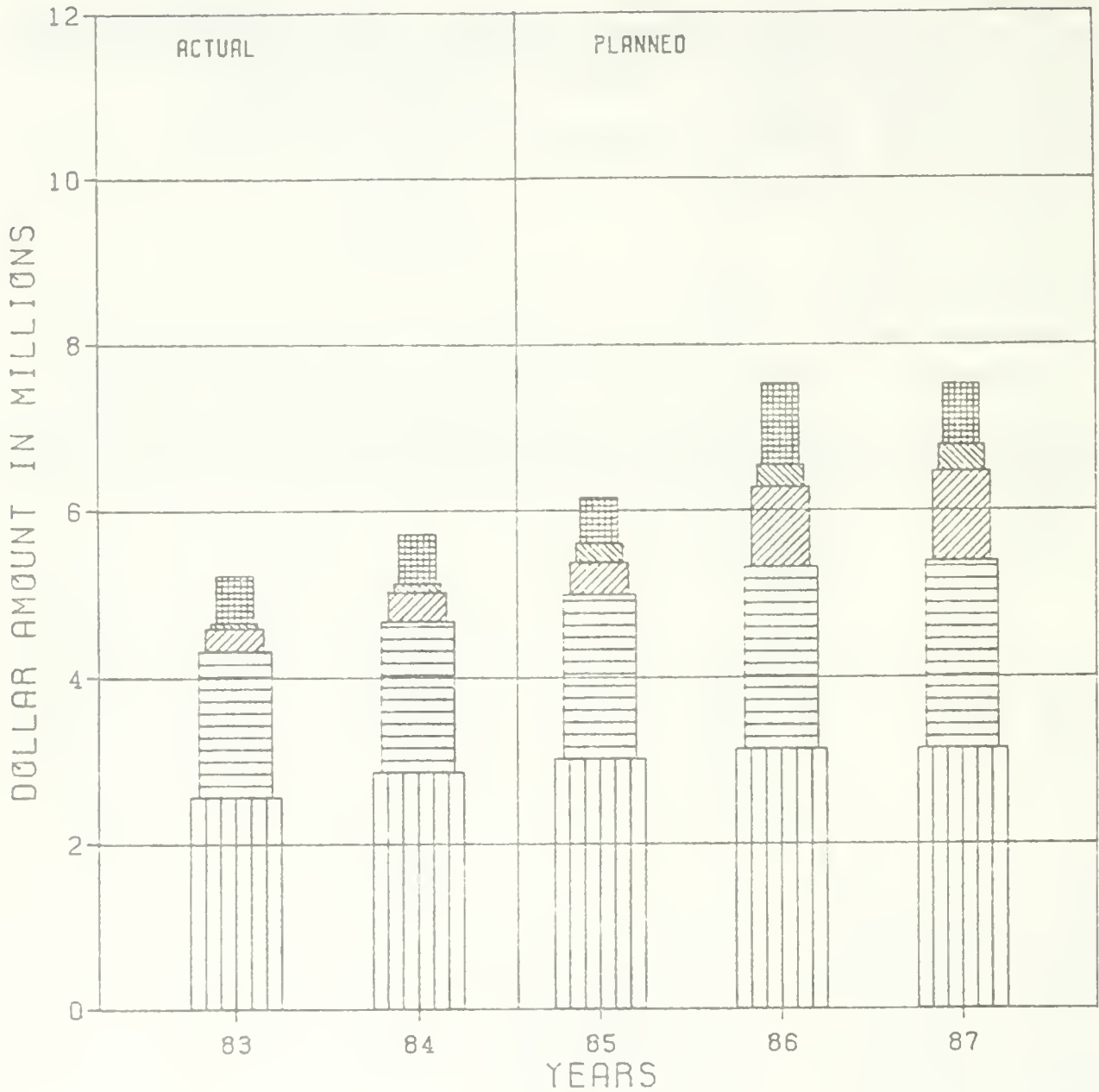
- Central Computer Operations
- Systems Development
- Telecommunications
- Information Center

An organizational chart describing bureaus and sections is included on page 34.

Information Services Division operates the central computer on a cost recovery basis. Agencies are charged for use of the central computer and other ISD services. Page 36 details ISD expenditures for fiscal years 1983 through 1987.

INFORMATION SERVICES DIVISION

DISTRIBUTION OF EXPENDITURES BY TYPE



INFORMATION SERVICES DIVISION EXPENSES
EXCLUDING TELECOMMUNICATIONS BUREAU

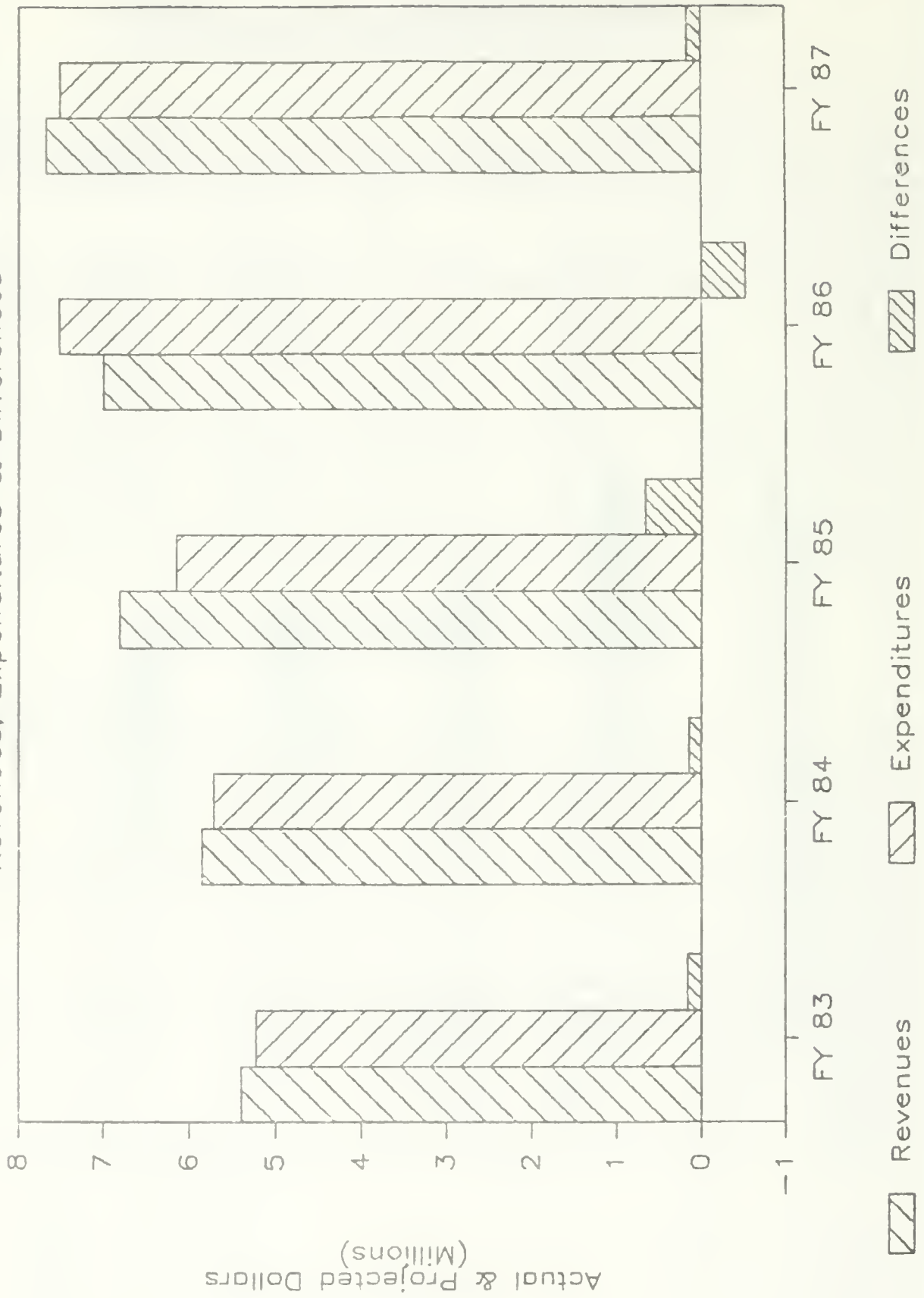
	1983	1984	1985	1986	1987
Personnel	\$ 2,525,188	\$ 2,828,000	\$ 2,986,640	\$ 3,099,226	\$ 3,102,755
Computer Processing	0	0	0	0	0
Equipment	1,750,706	1,789,400	1,965,000	2,172,000	2,245,000
Software	265,492	350,000	384,000	961,000	1,078,000
Supplies	297,338	308,800	323,800	391,800	447,800
Consulting	5,541	30,000	0	100,000	105,000
Communications	70,911	102,000	236,000	272,000	322,000
Other	264,246	247,000	209,000	481,000	171,000
TOTAL	\$ 5,179,422	\$ 5,655,200	\$ 6,104,440	\$ 7,477,026	\$ 7,471,555

INFORMATION SERVICES DIVISION REVENUE
EXCLUDING TELECOMMUNICATIONS BUREAU

	1983	1984	1985	1986	1987
Personnel	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Computer Processing	3,610,000	3,898,000	4,584,000	5,625,000	6,208,000
Equipment	0	0	0	0	0
Software	0	0	0	0	0
Supplies	0	0	0	0	0
Consulting	530,000	663,000	786,000	750,000	750,000
Communications	268,000	240,000	258,000	325,000	375,000
Other	981,000	1,055,000	1,185,000	300,000	350,000
TOTAL	\$ 5,389,000	\$ 5,856,000	\$ 6,813,000	\$ 7,000,000	\$ 7,683,000

I.S.D. Excluding Telecom. Bureau

Revenues, Expenditures & Differences



SECTION IV--SUMMARY OF AGENCY PLANS

This section contains excerpts from the Agency Information System Plans found in Volume II. Included are summaries of accomplishments, information system goals, and agency expenditure data. Graphs showing information expenditures by type and the distribution of expenditures by agency are also included.

SUMMARY OF RECENT ACCOMPLISHMENTS

Agency information system accomplishments in the past have been in the areas of: installation of software and hardware systems, improving data telecommunications capabilities, information system planning, and sharing systems and data with other agencies.

The following is a partial list of agency accomplishments. Please refer to the 1984 Statewide Information System Plan--Volume II--Individual Agency Summaries, for more detail.

Legislative Fiscal Analyst's Office--Modified the Legislative Information Bill Status System (LIBS) to integrate with the Office of Budget and Program Planning systems and the Legislative Council's word processing system (ALTER).

Legislative Council--Used automated information systems to publish and manage Session Laws, Montana Code Annotated, House and Senate Journals, and Daily Bill Status.

Governor's Office--Used the state's mainframe word processing system (ATMS) to produce Executive Budget Book. Improved personnel service calculations in the budget projection process.

Secretary of State--Automated several systems on the state's host computer including: Administrative Rules Index, Corporation Records and Tradenames, Uniform Commercial Code. Developed office automation systems.

State Auditor's Office--Completed initial design work to allow online development of P/P/P system. Established agency user's group for online P/P/P and completed P/P/P User's Manual.

Office of Public Instruction--Completed Vocational Education Data System, GED test scoring system, and design of annual trustees financial system.

Department of Justice--Initiated upgrade to the Law Enforcement Message Switching System and implemented first phase of the Criminal History System.

Public Service Commission--Performed needs assessment and office automation study.

Montana State Library--Formed statewide Library Automation Committee. Promoted Montana libraries participation in regional library network. Installed microcomputers to automate various office functions.

Montana Historical Society--Acquired microcomputers for office automation and small data processing applications.

Department of Fish, Wildlife and Parks--Developed Geographic Information System (shared with State Lands) for tracking habitat and wildlife distribution. Participated in the development of a lands inventory system to be shared by Parks Division and State Lands.

Department of Health and Environmental Sciences--Developed WIC Certification system. Updated Air Quality Data Management, Licensing Program for Food and Consumer Safety, and Water Analysis Data software systems.

Department of Highways--Developed Maintenance Management, Funding Obligation, Right of Way Negotiations, and Appraisal software systems. Road Design System software was acquired and installed. Minicomputer hardware was upgraded and an integrated office automation system was installed.

Department of Lands--Developed statewide data model outlining functional areas. Developed specifications and designed software for trust land management.

Department of Livestock--Established Brands database for recording and managing brand information. Established computerized information system for livestock herds and testing.

Department of Natural Resources and Conservation--Developed software system for: Mine Reclamation, Fuel Monitoring, Oil and Gas Data. Started work on computerized bibliography of siting studies.

Department of Revenue--Modified software systems including the Reappraisal System, and the Individual Income Tax System. Analyzed software systems including Medicaid Fraud, Child Support Enforcement, and Liquor Inventory Management System. Began pilot project for automating liquor stores. Developed a comprehensive department-wide data model.

Department of Administration--Designed Teacher's Retirement System. Implemented Investment Accounting, and Portfolio Management software systems. Offered direct user office automation support from Information Center. Developed state-wide information systems plan. Replaced and upgraded major telephone switching system. Converted SBAS treasury fund structure to conform with GAAP.

Department of Agriculture--Automated License and Registration Fees, Insect Trapping data, and Environmental Protection Agency reports.

Department of Institutions--Established Information Task Force to identify information needs and priorities. Developed a data model for correction information.

Department of Commerce--Developed business information software system to help promote 'Made in Montana' products.

Department of Labor and Industry--Installed Management Information System (MIS) for Job Training Partnership Act. Implemented online distributive processing to Job Service field offices. Upgraded Unemployment Insurance Tax software system. Completed final testing for Worker's Compensation MIS.

Department of Social and Rehabilitation Services--Upgraded major software system. Issued RFP to replace current Montana Medicaid Information System with state owned system. Acquired hardware and software to implement Social Security's CASCON system automating disability determination case control functions.

Supreme Court--Acquired and installed office automation system. Continued to utilize State Judicial Information System.

SUMMARY OF AGENCY INFORMATION SYSTEM GOALS

A planning process was approved by the Data Processing Advisory Council in January 1984. Agency information system planning began in March 1984. Each agency was asked to summarize agency goals, accomplishments, and information systems goals and strategies.

The agency information systems plans were designed to be used as an internal management tool. The agency's plans can help to avoid a reactive, crisis-oriented approach to management of information resources.

For further information about specific agency plans, refer to the 1984 Statewide Information Systems Plan--Volume II--Individual Agency Summaries. The following summarizes the agency information systems goals:

Legislative Auditor's Office--Continue to automate auditors functions using microcomputer technology. Automation must take into consideration the need for security and integrity of audit related data.

Legislative Fiscal Analyst's Office--Provide budget analysts with computer tools (including personal computers) to better analyze budget requests.

Legislative Council--Improve the information flow among legislators, government agencies, and the public. Reduce the cost of providing information when possible.

Governor's Office--Increase the use of microcomputers for word processing and office management to improve the quality of information available.

Secretary of State--Provide on-line access to Uniform Commercial Code filing information. Automate the tracking of notaries public and agricultural commodities.

State Auditor's Office--Develop the full management information system (MIS) potential of the Payroll/Personnel/Position control system. Ensure reliability and security of the P/P/P system.

Office of Public Instruction--Integrate all information, communications and data processing operations through use of OPI Computer Advisory Committee and user group. Develop statewide network for communication among county superintendents.

Department of Justice--Expand information available to law enforcement and criminal justice agencies. Provide better service to Law Enforcement Telecommunication System (LETS) users. Modify and improve several automated systems.

Public Service Commission--Improve decision support information and productivity of PSC employees by implementing appropriate computer tools, and providing training to assure that the tools are used properly. Promote the use of information in an electronic form to minimize communication delays.

Montana State Library--Improve staff productivity and enable MSL to allocate a larger percentage of staff to providing personal services to clients. Develop a long range plan for a statewide computer based network linking Montana libraries. Improve access to budget and accounting information.

Montana Historical Society--Automate various functions including grants management, and statistics for the Federal Government. Develop database for Library and Photo Archives.

Department of Fish, Wildlife and Parks--Develop a flexible statewide population model for wildlife and fish. Provide data and word processing resources. Improve communication within the department by implementing a communication network. Enhance and complete the geographic information system.

Department of Health and Environmental Sciences--Promote appropriate electronic sharing of information by analyzing common information needs, establishing uniform data standards, and developing an information systems management plan. Educate staff on information technologies to increase productivity.

Department of Highways--Reduce the time required to design highway projects, and to collect survey data. Improve the quality control and monitoring of materials. Convert cost accounting methods to SBAS compatible where ever possible. Improve project status information supplied to upper management and operational support systems for users and middle management.

Department of State Lands--Provide an information management and decision support system for all state trust land. Provide word processing support. Provide a functional communications system between the department and field offices in conjunction with the state's long range telecommunications plan. Provide information necessary to support management decisions.

Department of Livestock--Integrate the common informational needs of the department's four divisions. Provide a greatly enhanced management information base to aid in decision making and planning.

Department of Natural Resources and Conservation--Improve office automation, word processing and data processing support for the department. Operate and monitor the various loan and grant programs that are the departments responsibility. Improve communications and data transfer capabilities.

Department of Revenue--Improve the quality, accessibility, and flow of management and policy information. Improve the ability to retrieve and interchange information among automated systems. Seek cost beneficial means of increasing rate of processing tax related information.

Department of Administration--Provide additional processing power to handle an expanding workload on the state's central computer. Minimize the impact of a disaster on the state's central computer. Coordinate equipment and software acquisitions to assure consistency with the state-wide planning direction. Improve the systems development process. Implement systems to improve decision support information and provide a method for exchanging information in an electronic form.

Department of Agriculture--Provide agency-wide coordination and programming. Establish an improved field office communication system. Automate issuance of registrations, licenses, and reports. Maintain and monitor all bond/loan activity to ensure proper use of Industrial Development Bond funds.

Department of Institutions--Increase user access to information throughout the department by networking word processors for electronic mail, text storage, and distribution purposes. Finalize development of an adult corrections information system. Provide the divisions with the information necessary to efficiently carry out their functions.

Department of Commerce--Develop information systems which assist in providing Montana low and middle income families with safe, affordable housing. Develop management information systems to provide administrative assistance to professional, occupational, and device licensing boards. Implement an automated system to assist local governments in planning and resource management. Automate systems to allow

the department to quantify costs and benefits of impending changes in transportation systems.

Department of Labor and Industry--Improve productivity of clerical and professional staff. Improve dependability of the unemployment insurance benefits payment system. Enable the benefits system to interface with other systems such as the Overpayment Accounting Control System, the Application Information File on the Job Service 8100's, and the Child Support Function from the Department of Revenue. Improve responsiveness to Worker's Compensation claims management requirements.

Department of Social and Rehabilitation Services--Expand the Client Data Base to include new functions, provide more comprehensive management reporting, and reflect program changes. Develop information systems to provide Developmental Disabilities Program managers with financial information, and to improve service to clients. Establish an automated information system to manage and administer the Aging Services Program. Increase reliability and useability of existing systems. Provide point of origin data entry and on-line inquiry for county workers. Automate manual processes for centralized services.

TOTAL EXPENDITURES

	1983	1984	1985	1986	1987
Leg. Auditor	\$ 108,000	\$ 133,000	\$ 101,000	\$ 133,000	\$ 151,000
LFA	46,000	27,000	53,000	25,000	63,000
Leg. Council	879,000	527,000	1,047,000	637,000	1,026,000
Gov. Office	283,000	288,000	288,000	291,000	318,000
Sec. of State	90,000	232,000	169,000	267,000	284,000
State Auditor	417,000	762,000	695,000	721,000	770,000
OPI	217,000	226,000	246,000	265,000	287,000
Justice	1,317,000	1,334,000	1,610,000	1,700,000	1,422,000
PSC	20,000	24,000	251,000	185,000	189,000
St. Library	112,000	130,000	189,000	315,000	226,000
Hist. Soc.	35,000	31,000	29,000	25,000	18,000
FWP	559,000	621,000	667,000	851,000	687,000
Health/En. Sc.	395,000	392,000	399,000	430,000	413,000
Highways	1,978,000	2,050,000	2,131,000	3,481,000	2,087,000
State Lands	258,000	170,000	338,000	835,000	682,000
Livestock	146,000	149,000	153,000	231,000	241,000
DNRC	731,000	793,000	841,000	930,000	923,000
Revenue	1,630,000	1,607,000	1,958,000	4,210,000	2,525,000
Admin.*	1,325,000	1,682,000	1,819,000	1,475,000	1,483,000
Agriculture	106,000	73,000	117,000	101,000	99,000
Institutions	564,000	711,000	930,000	871,000	751,000
Commerce	297,000	393,000	585,000	575,000	499,000
Labor & Ind.	2,291,000	3,557,000	4,058,000	2,828,000	2,804,000
SRS	2,740,000	3,143,000	4,944,000	3,974,000	4,004,000
TOTALS	\$16,544,000	\$19,055,000	\$23,618,000	\$25,356,000	\$21,952,000

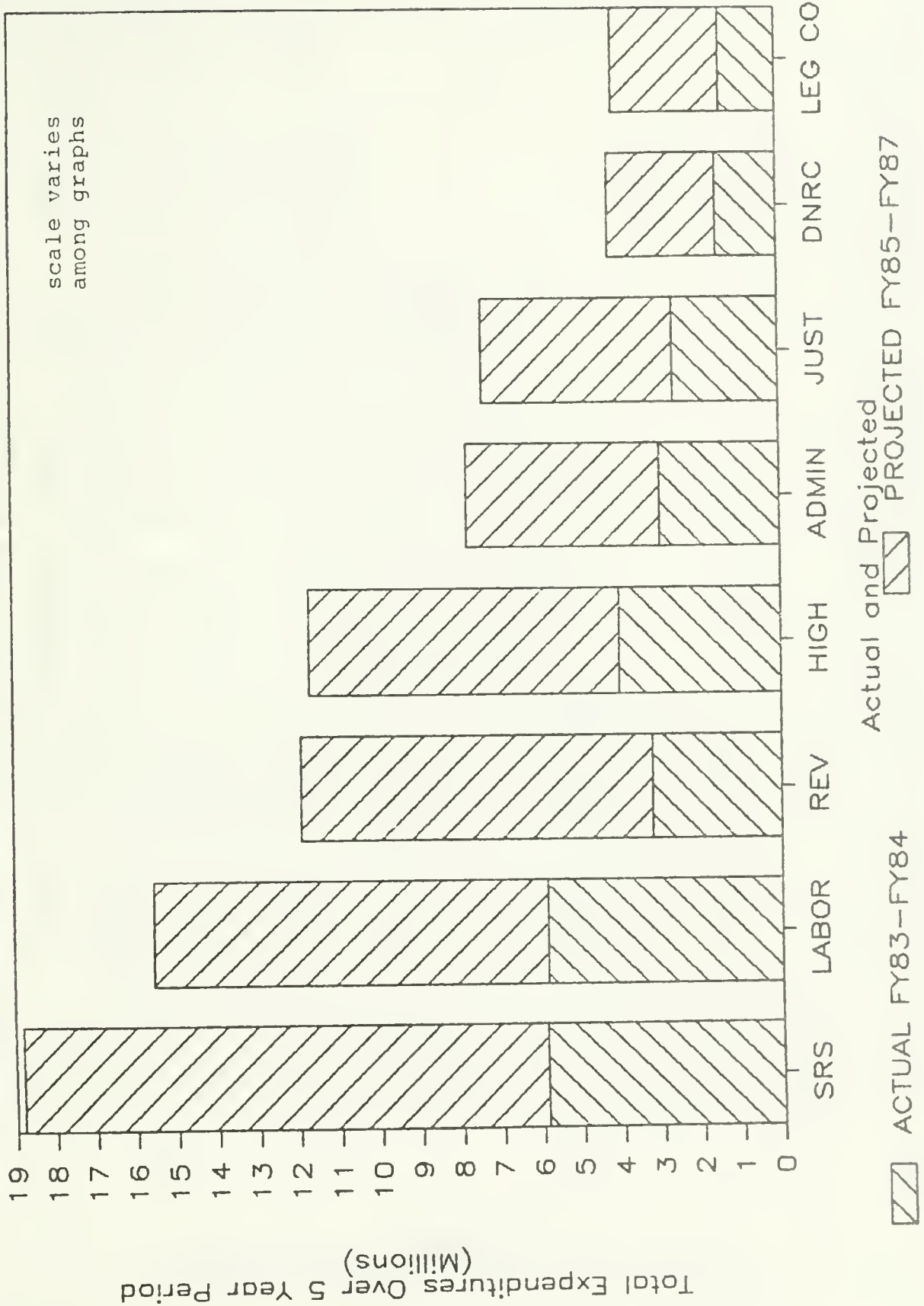
* Excludes Information Services Division

STATE TOTAL EXCLUDING INFORMATION SERVICES DIVISION

	1983	1984	1985	1986	1987
Personnel	\$ 7,438,000	\$ 7,785,000	\$ 8,804,000	\$ 9,539,000	\$10,059,000
Computer Processing	4,507,000	5,124,000	5,616,000	6,562,000	6,529,000
Equipment	2,072,000	3,093,000	3,295,000	4,742,000	1,471,000
Software	185,000	164,000	453,000	368,000	278,000
Supplies	196,000	168,000	266,000	411,000	301,000
Consulting	694,000	1,327,000	3,628,000	1,876,000	1,675,000
Communications	214,000	187,000	252,000	315,000	381,000
Other	1,193,000	1,207,000	1,304,000	1,543,000	1,258,000
TOTAL	\$16,544,000	\$19,055,000	\$23,618,000	\$25,356,000	\$21,952,000

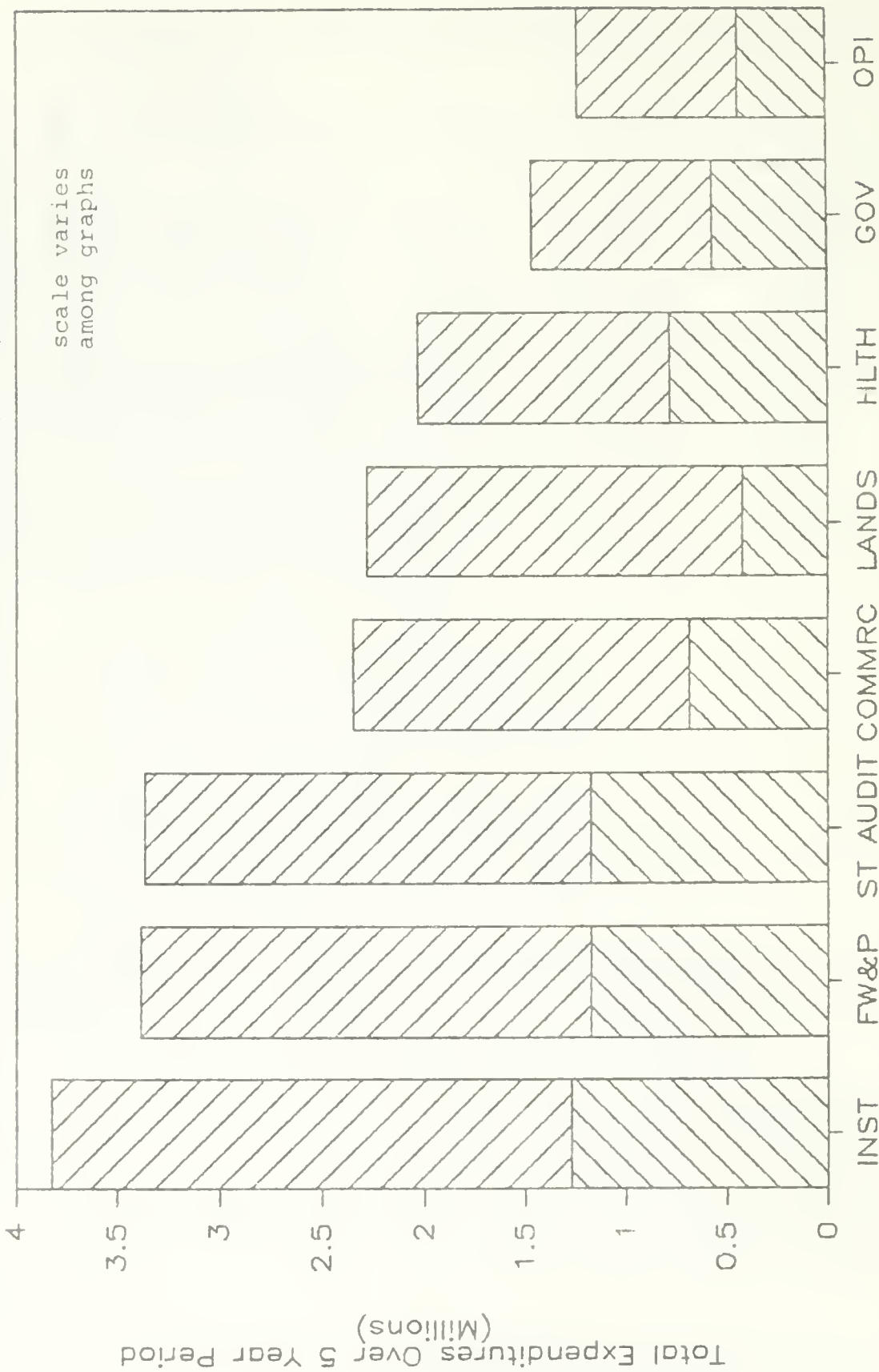
5 Year Information System Expenditures



AGENCIES WITH INFORMATION SYSTEM BUDGETS BETWEEN \$4 - \$19 MILLION DOLLARS



5 Year Information System Expenditures

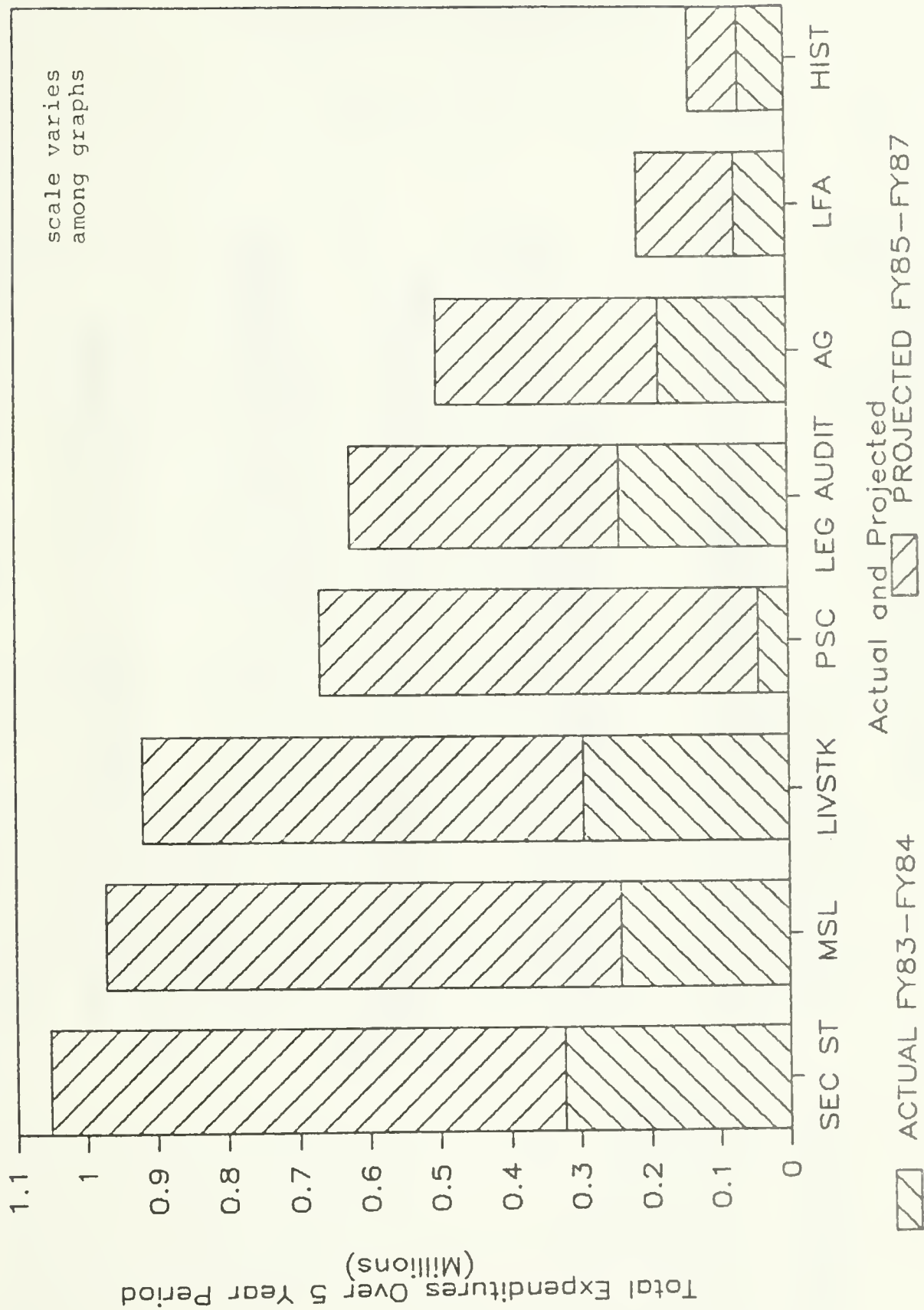
AGENCIES WITH INFORMATION SYSTEM BUDGETS BETWEEN \$1 - \$4 MILLION DOLLARS



 ACTUAL FY83-FY84
  PROJECTED FY85-FY87

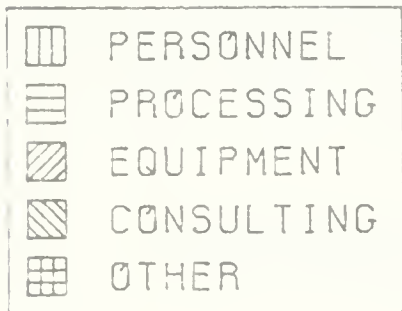
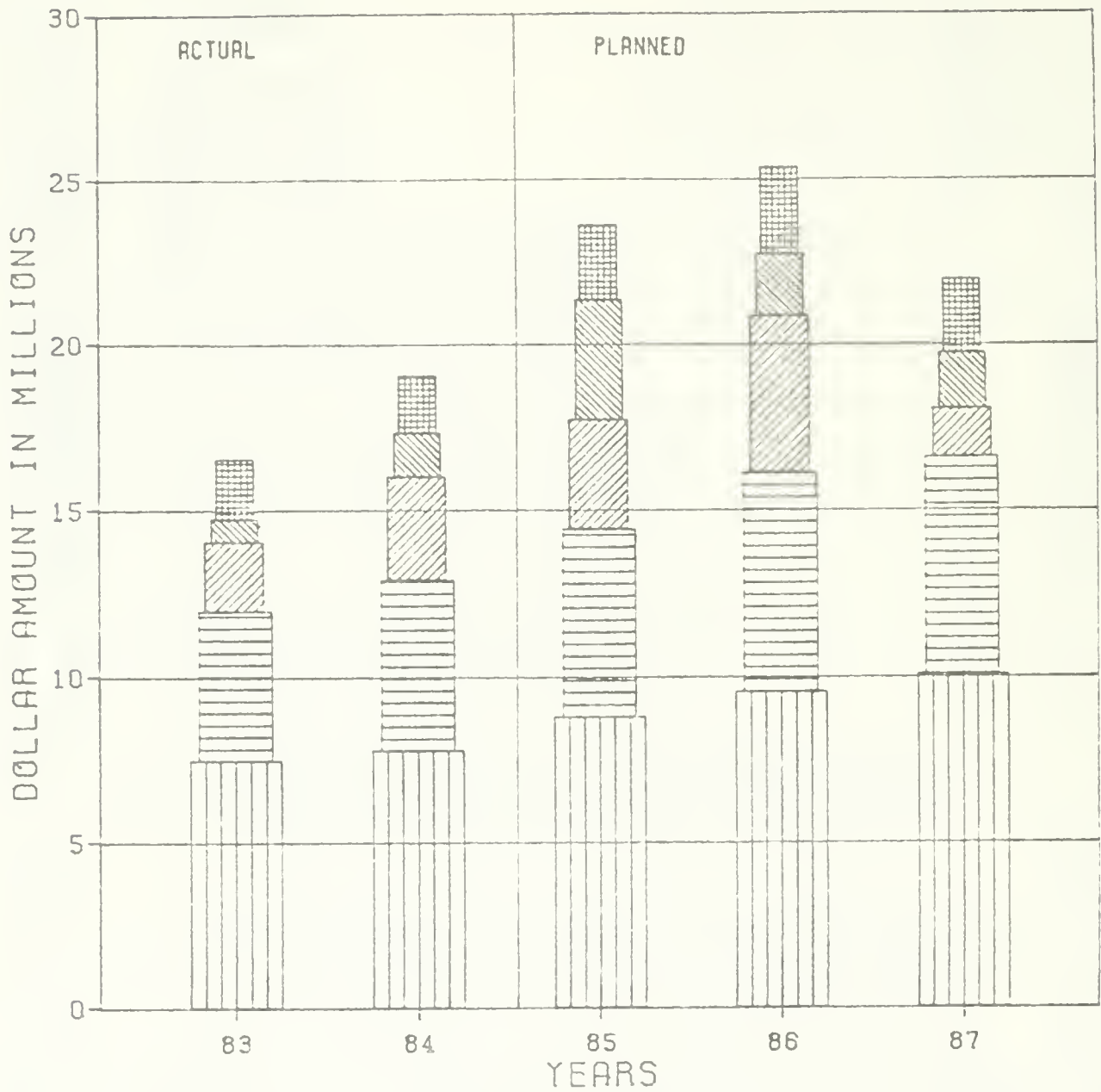
5 Year Information System Expenditures

AGENCIES WITH INFORMATION SYSTEM BUDGETS BETWEEN \$0.1 - \$1.1 MILLION DOLLARS



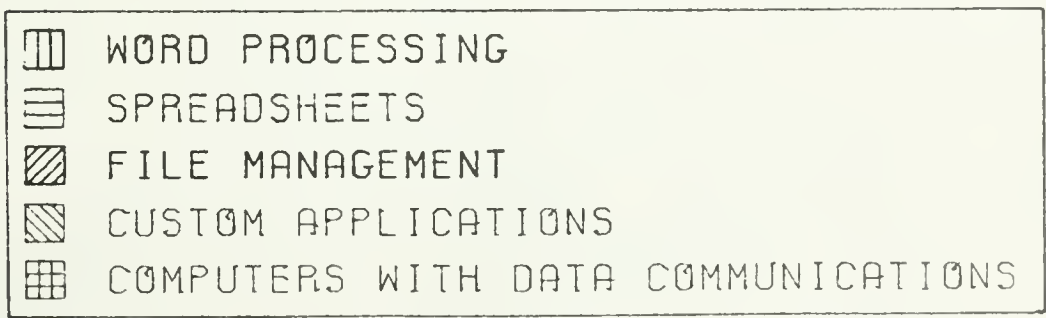
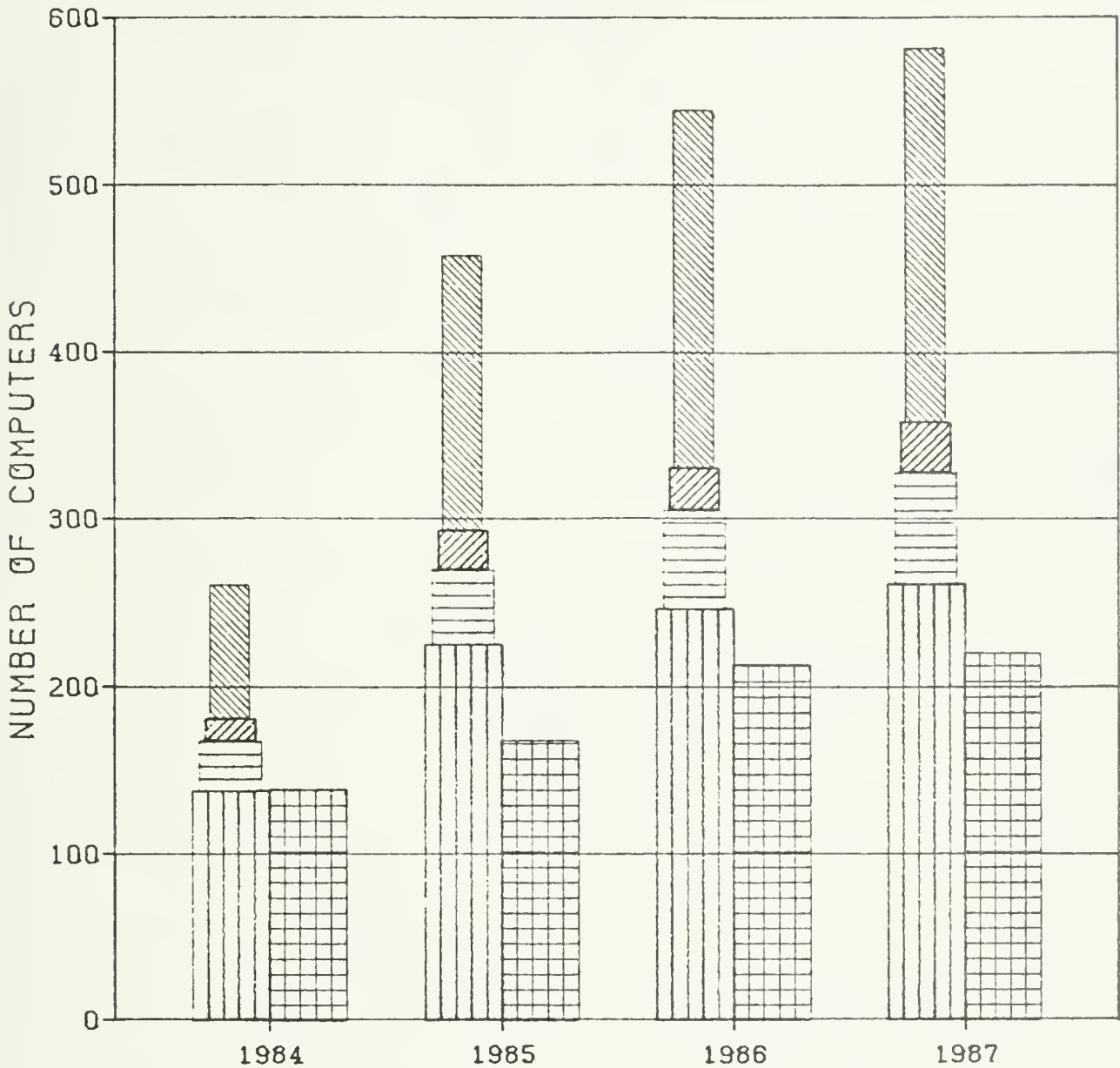
TOTAL STATEWIDE EXPENDITURES

EXCLUDING INFORMATION SERVICES DIVISION



PROJECTED GROWTH

SINGLE USER COMPUTER



ACKNOWLEDGEMENTS

Many people contributed to this plan. Without their willing participation, this plan would not have been written. The following list includes policy makers who shaped the plan with information systems goals--and those who contributed facts and figures.

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GLOSSARY

Note: the entries in this glossary are edited for brevity, not comprehensiveness. For expanded definitions, see IBM's "Vocabulary for Data Processing, Telecommunications, and Office Systems". A copy is available from the Information Center Bureau, Department of Administration.

agency goal: A goal which describes an agency's direction with regard to its field of endeavor; the overall agency service and operation direction.

application: The use to which a data processing system is put; for example, a payroll application.

application software: Computer programs written to do the data processing tasks of a specific application. (Contrast with system software.)

asynchronous transmission: The communications protocol used by most microcomputer and non-IBM devices.

batch processing: A number of data processing jobs grouped together and executed serially.

binary synchronous transmission: The communications protocol used by IBM mainframes and minicomputers.

business process: A group of logically related decisions and activities required to manage the resources of the business.

central computer: Shared mainframe computer located at Dept. of Administration.

communications: see data telecommunications

computer architecture: The specification of the relationships between parts of a computer system.

computer system: A functional unit consisting of one or more computers, software, and peripheral devices.

concentrator (telecommunications): A unit for combining the data from a number of circuits into a single circuit for economical transmission.

cost benefit analysis: An examination of the cost and benefits associated with implementing an information system tactical plan.

data base: (often spelled as a single word, database) A collection of interrelated or independent data items stored together without unnecessary redundancy, which may serve one or more applications. A structured collection of data fundamental to a system.

DISOSS: see Distributed Office Support System

DP: see data processing

data: Facts, concepts or instructions suitable for communication, interpretation or processing by humans or automatic means.

data communications: see data telecommunications

data processing: The execution of a programmed sequence of operations upon data. Generic term for computing.

data telecommunications: The transmission and reception of data over telecommunication lines. See telecommunications.

decentralized data processing: An arrangement of computers and software which place stand-alone computers (not able to communicate between each other) at the location of the end-user. (contrast with distributed processing.)

development projects: Information management related projects which result in new services for agency or significantly alter an existing service.

distributed data processing: An arrangement of computer systems which place data processing capabilities at the location of the end user; but which may also communicate with each other or with a central computer.

Distributed Office Support System (DISOSS): An IBM software system which utilizes IBM communications protocols to store, retrieve, and transmit electronic mail.

electronic mail: Sending documents electronically.

end-user: A person whose work is assisted by using a computer; ultimate beneficiary of computing.

end-user computing: End-user direct use of computers to accomplish a task or set of tasks.

entity: A person, place, or thing, or concept that has characteristics of interest to the organization. An entity is something about which we store data.

entity diagram: A diagram showing the entities or entity records and the associations among them.

expenditure categories:

- information systems personnel - see information systems personnel
- computer processing services - any computer processing expenses incurred from service providers outside an agency
- computer equipment - see hardware
- computer software - see software
- computer supplies - paper, diskettes, ribbons, disks
- consulting/development services - consulting or development services acquired from sources outside an agency
- data communications services - data communication expenses, see data communications.

expenditure summary: Information concerning expenditures incurred while performing information resource management functions.

functional area: A logical subdivision within an agency.

goal: A broad, general statement of direction.

hardware (computer hardware): physical equipment used in data processing, as opposed to software.

host computer: see central computer, mainframe computer

I/O: Input/Output. The process of getting data into or out of a computer. A device by which data may be entered into or received from a computer system, or both; for example, a terminal or magnetic tape unit.

information: The meaning a human assigns to data by means of conventions applied to that data; any difference that makes a difference. Useful data.

information management system: A system designed to organize, catalog, store, locate, retrieve, and maintain information.

information resource management: Those functions required to manage information (both automated and manual) throughout the business.

information system: The vehicle used to insert data into the extract data from data bases, perform the required processing, and deliver information as specified.

information system goal: A goal which defines the way information systems relate to the agency goal. Long or medium range agency goals related to information management.

information system strategies: specific plans of action for accomplishing information system goals.

information systems personnel: Positions are divided into five categories:

1. information systems management (supervisors and administrators)
2. information systems analysts and programmers
3. computer operations (computer operators and technicians) tape librarians, teleprocessing operators and technicians)
4. data entry/word processing staff
5. other information systems related staff (software specialists, database technicians, data management analysts)

inventory of equipment and software: Information concerning the computer equipment and software resources of the organization.

MIS: see management information system

mainframe computer: a computer with a relatively large central processing unit and storage.

major hardware or software systems: A system which costs more than \$10,000, has significant interagency implications, has significant multilocation impact, affects other systems, or is considered noteworthy by agency heads.

management information system: An information management system designed to support management decision making.

microcomputer: see personal computer

minicomputer: A general purpose computer with peripherals designed to meet application requirements. Larger than a personal computer and smaller than a mainframe computer (in terms storage, speed, and capabilities).

modem: Modulator/Demodulator. A device which is frequently used to allow computers to transmit and receive data.

OA: see office automation.

objective: A specific and measurable item or element of a goal.

office automation (OA): A procedure or set of procedures which bring office tasks under automatic or self regulating control. OA uses computers for: word processing (form letters, large reports, revisable documents), data processing (calculations, ledgers, financial analysis, budget preparation), desk management (calendars, scheduling, personal filing), electronic mail (distributing documents in an electronic form), voice processing (voice mail and soon text-to-speech), graphics (charts, maps, illustrations), and voice and data telecommunications.

ongoing projects: information management projects which continue at roughly the same levels of service.

online: Pertaining to equipment under the control of the computer. Also pertains to a user's access to a computer via a terminal.

operating system: Software which controls the execution of computer programs on a computer.

peripheral device: Any equipment online to the central processing unit; for example, disk storage units, communications controllers, or printers.

personal computer: A smaller computer with attached keyboard, monitor, storage devices, printer, and often a modem. Used individually to perform a task or set of tasks. Can be used to communicate with other computers.

personnel summary: Information concerning the personnel resources directly involved in the information resource management function.

policy: A definite course or method of action selected from among alternatives and in light of given conditions to guide and determine present and future decisions related to information systems.

programming: The designing, writing, and testing of software.

protocol: A specification for format and timing of information exchanged between communicating computers.

resource plan: A plan concerning the control of resources within the framework of the information systems objectives.

resource requirements: That which is used or consumed by the organization in order to fulfill the information system objectives.

single user computer: One which services one workstation and has its own central processing unit, storage and other peripheral devices.

situation assessment: Information concerning the status of information systems within the organization.

software: A set of instructions and procedures which carries out operations on a computer.

software system: Program or system of programs which carry out tasks for the end-user.

spreadsheet: Software to display and manipulate data arranged in rows and columns at a computer terminal. Relationships between the items in the spreadsheet may be programmed to do such tasks as budget analysis or forecasting, and numerical modeling, with the results of changed values quickly displayed.

strategy: A plan for achieving an information system goal.

summary of accomplishments: Information concerning the attainment of information system objectives.

systems analysis: The analysis of an activity to determine precisely what must be accomplished and how to accomplish it.

system software: Computer programs such as operating systems which are not specific to any one application.

telecommunications: Pertaining to the transmission of signals over long distances. Data transmission between computing systems.

teleprocessing: Remote access data processing.

word processing: A means for improving the efficiency and effectiveness of business communications. Pertaining to machines, systems, or processes which facilitate text entry and formatting for written business communications.

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